

UI Campus Microgrid Expansion Senior Design

“The Facilitators”

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Project Goal


- Expand the current microgrid design to encompass more critical loads on campus in the case of an outage from Avista.
- Relays, switches, and controls will be tactfully integrated to ensure load-shedding capabilities.
- Prioritizing and assessing which loads on campus can/should be included in the microgrid with the given capacity.
- Account for seasonal changes and their effects on energy efficiency.

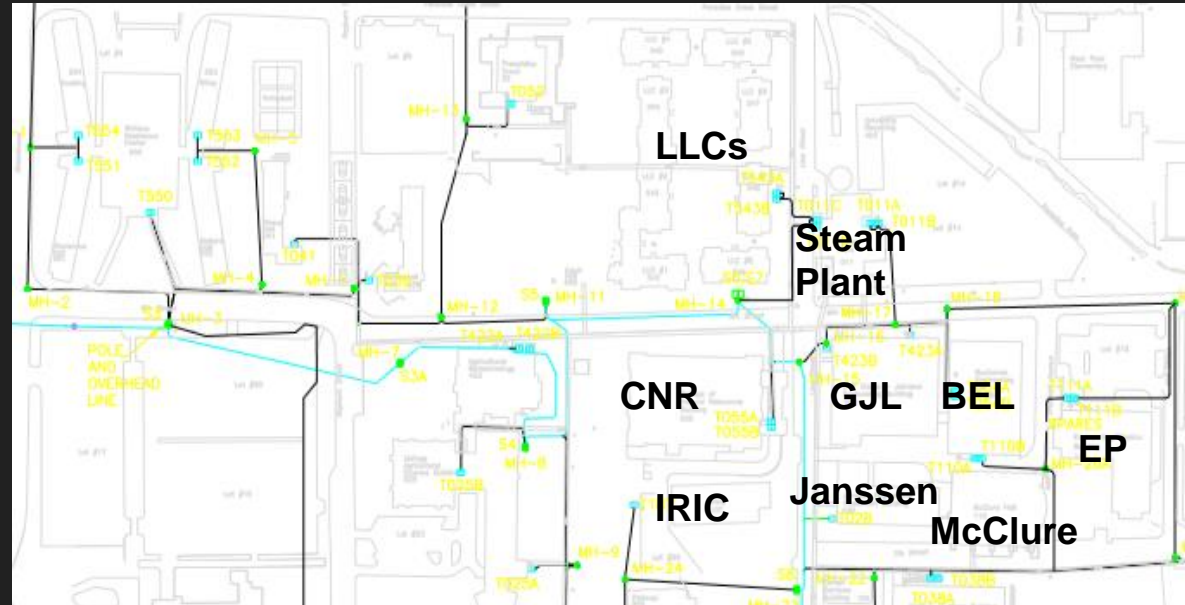
Available Generation

- UI Steam Plant Turbines
- IRIC Solar Array
- Solar Backup Power Array
- Backup Generators



New Loads

- Janssen Engineering Building
 - Engineering Physics Building
 - LLC and North Campus Chiller Plant
 - Wells
 - IRIC
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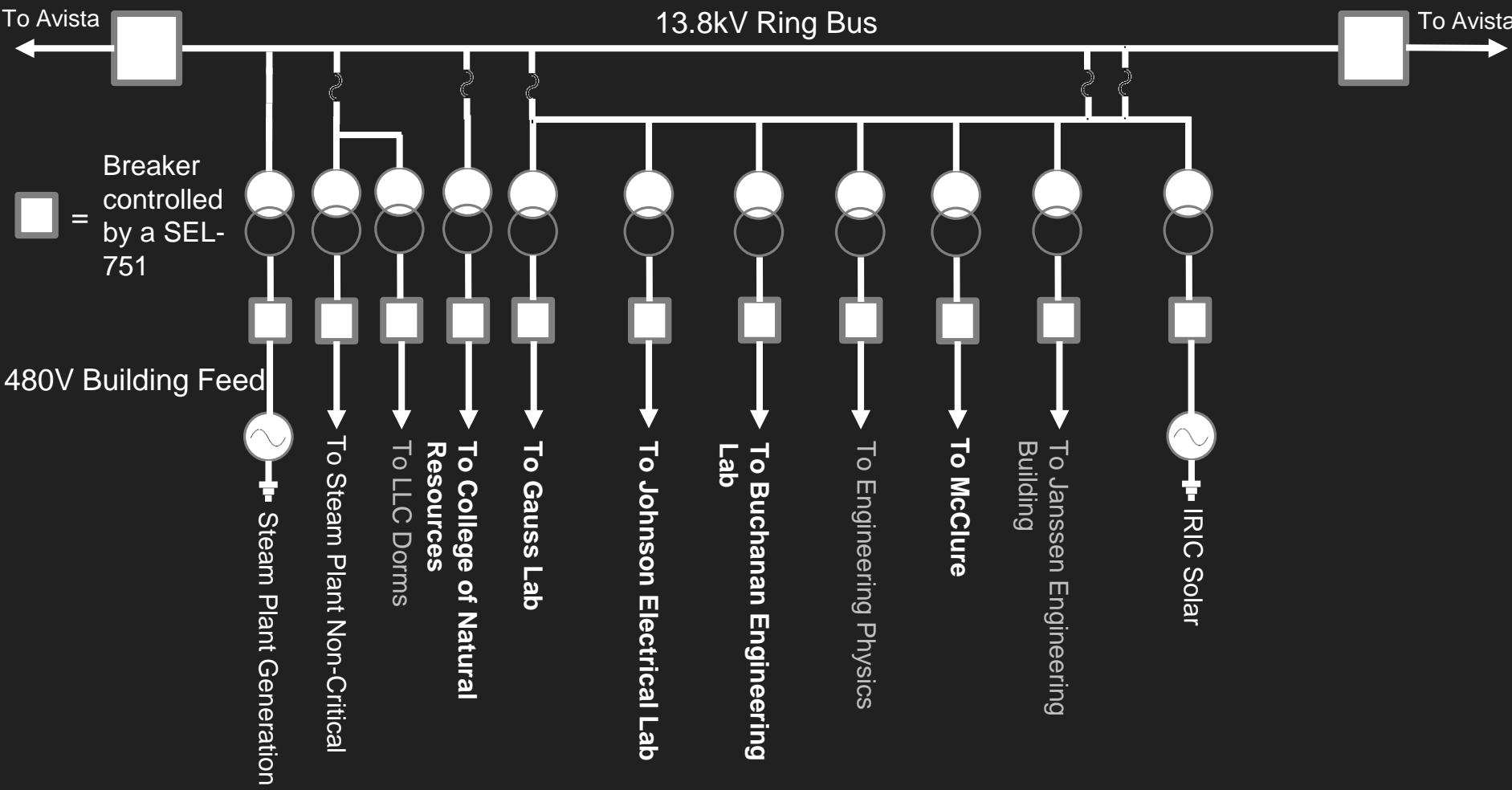


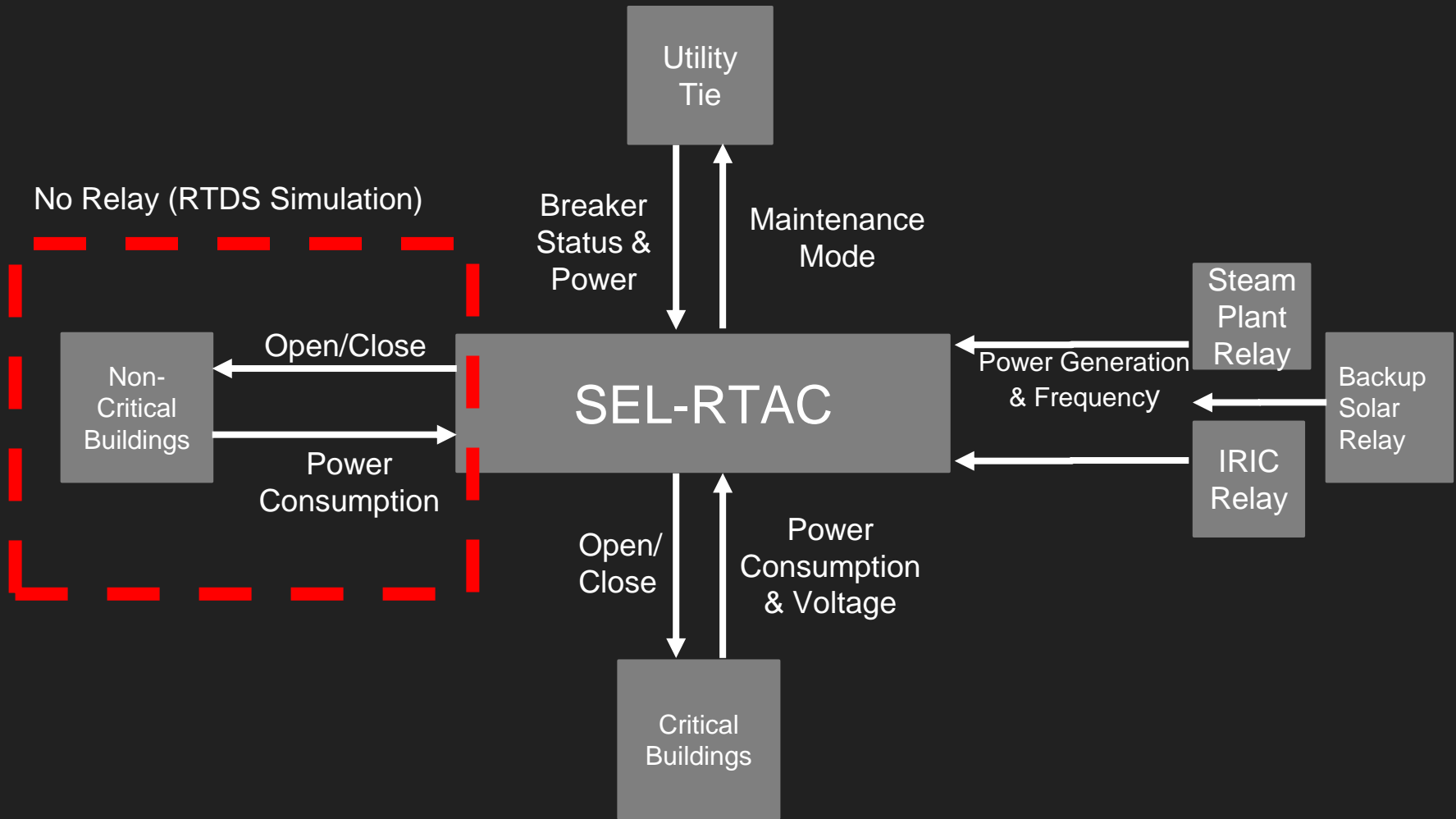
Design Approach

- Take advantage of backup generators in buildings that have them to support priority emergency circuits. (McClure, BEL, CNR, EP, GJL, IRIC)
- Assess available surplus IRIC solar generation upon outage to be provided to loads.
- Determine usable Solar Backup Generation power after its priority load (wells) have been supported.
- Tactfully integrate switchgear to ensure efficiency and safety of connectivity between sources and loads.
- Expand and alter previously developed load shed algorithm to accommodate this new systematic approach and account for new sources/loads.

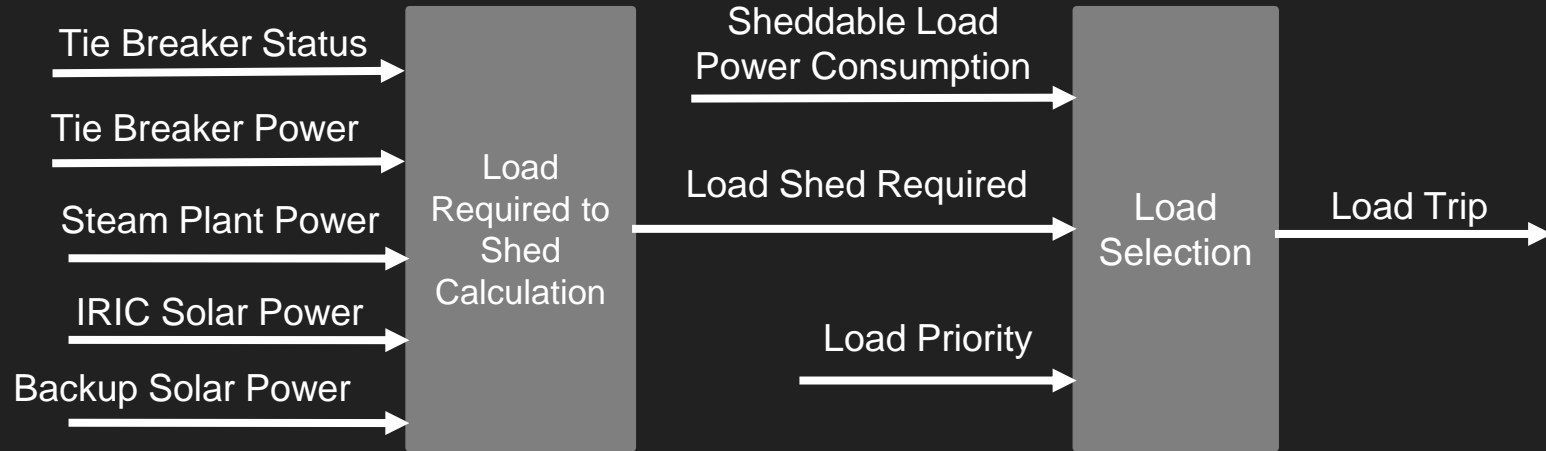
Benefits

- Backup generators will support their individual buildings' 480V emergency circuits allowing for them to remain isolated and non-synchronous, thus saving money.
- Steam plant generation currently being used to support these circuits in buildings with generators can be allocated to other loads.

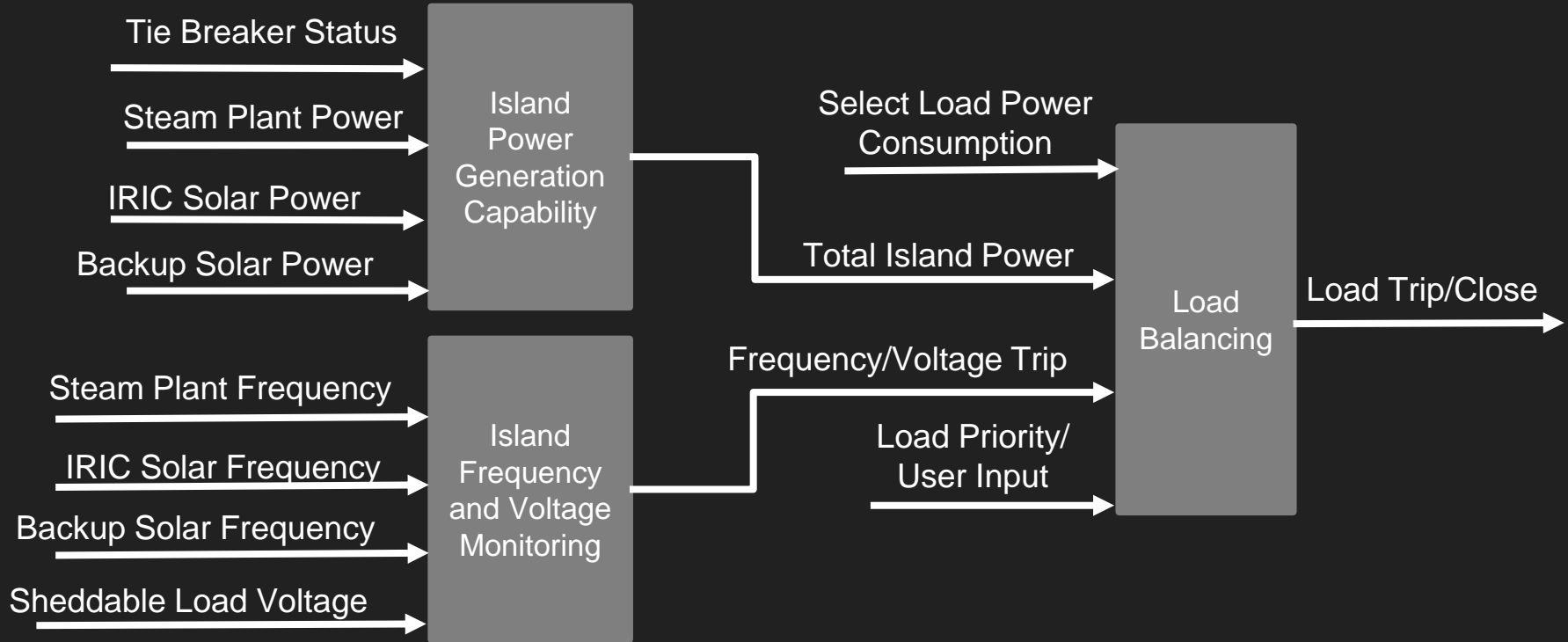




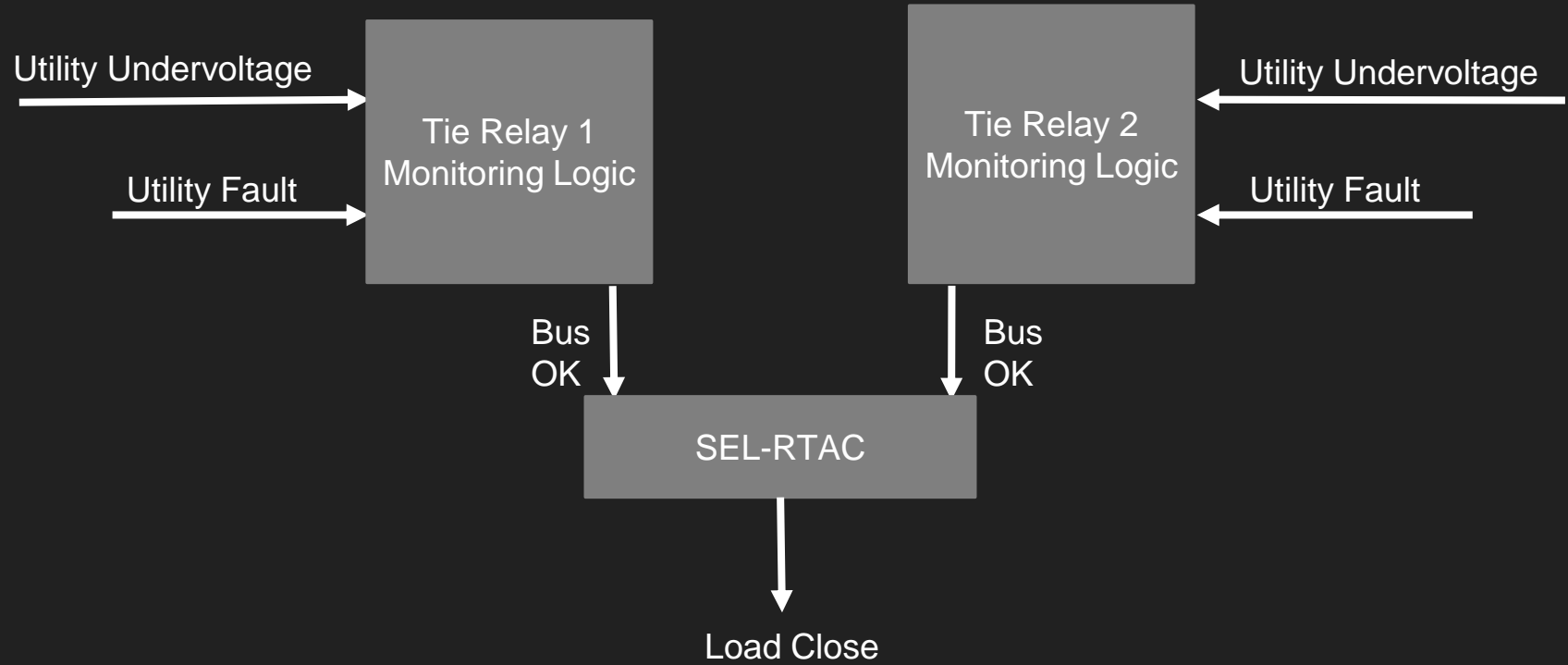
RTAC Initial Islanding Algorithm



RTAC Power Balance Algorithm



Return to Utility Logic



Testing and Deliverables

- RTDS (Real Time Digital Power System Simulator) testing with Facilities as witness. (Dependent on attainable SEL equipment)
- Analysis of Seasonal (monthly) effects on available generation from all sources.
- Economic Analysis
 - Suggested addition of more SEL 751 relays and remote breakers
 - Cost/benefit analysis

Microgrid Expansion

